



APPLICATION FOR UNITED STATES LETTERS PATENT

FOR

SYSTEM FOR EVALUATING TREATMENT  
OF CHEST PAIN PATIENTS

Inventor: Dr. Anthony Joseph

Attorneys: Standley & Gilcrest  
Attn.: Jeffrey S. Standley  
555 Metro Place North  
Suite 500  
Dublin, Ohio 43017  
Phone: (614) 792-5555

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OF CHEST PAIN PATIENTS

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BACKGROUND OF THE INVENTION

This invention relates generally to a data processing system and method for evaluating medical treatment. More particularly it relates to a data processing system and 10 method for evaluating treatment of chest pain patients.

Coronary heart disease is the number one killer of Americans. It accounts for nearly twenty percent of the national health care budget. The chief complaint of between five and eight percent of the patients seen in emergency departments in 1994 was chest pain. However, only a small percentage of patients experiencing chest pain have acute 15 myocardial infarction (AMI) or a significant risk of AMI.

Traditionally, most patients who complained of chest pain were admitted to hospitals for evaluation until a determination could be made concerning whether the patient had AMI or was at significant risk of AMI. Inpatient evaluation of chest pain is very expensive. In response to the high cost of inpatient evaluation, many hospitals have 20 developed alternatives to inpatient evaluation.

The Emergency Chest Pain Unit was originally designed as a way to prevent primary ventricular fibrillation. It usually falls within the province of the Emergency Department. Today, it is charged with responsibility for early recognition and treatment of patients with AMI. Another alternative is the Observation Unit. It is distinct from the 25 Emergency Chest Pain Unit. The primary function of the Observation Unit is the early

diagnosis and risk stratification of patients with underlying occult coronary artery disease. The use of alternatives such as these reduces the cost of treating chest pain, while allowing the proper diagnosis and treatment to occur. Hospitals need a way to evaluate the performance of these alternatives to inpatient care and to compare the performance of 5 inpatient treatment with emergency department treatment and treatment in an observation unit.

Rapid identification and treatment of patients with AMI is critical to their survival. Early intervention dramatically improves outcomes no matter what reperfusion strategy is used.

10 The standardization of the evaluation and treatment of patients complaining of chest pain is an important part of improving care. The National Heart Attack Alert Program Committee, the American Heart Association, and the American College of Cardiology have made specific recommendations that result in improved outcomes. For example, a goal of thirty minutes from entry into the emergency department to treatment 15 with thrombolytic therapy has been established by the National Heart Attack Alert Program Committee. In order to evaluate the effectiveness of these recommendations, it is important to be able to document and measure the performance of the recommendation accurately. Currently, there is no way to measure this performance objectively.

Since rapid diagnosis and treatment of AMI are critical to patient survival, 20 hospitals must be able to evaluate the performance of medical care providers objectively. Adherence to treatment protocols is an important factor in this evaluation. However, there is no objective way to measure adherence currently.

In addition, failure to diagnose heart attack is the number one malpractice problem in Emergency Medicine today, accounting for almost twenty percent of all malpractice dollars paid out. Emergency chest pain evaluation is a high volume, high risk arena. An organized system-wide approach to the diagnosis of heart attack can be  
5 viewed as a risk management tool.

Therefore, it would be desirable to have a way to evaluate objectively the performance of treatment protocols and the adherence of medical care providers to the treatment protocols in the treatment of chest pain.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a flow chart for part of a data verification procedure relating to patient arrival to ensure the validity of the patient treatment information.

Fig. 2 is a flow chart for part of a data verification procedure relating to patient symptoms to ensure the validity of the patient treatment information.

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Fig. 3 is a flow chart for part of a data verification procedure relating to the date and timing of testing to ensure the validity of the patient treatment information.

*and 3B show*

*Fig. 3A* is a flow chart for part of a data verification procedure relating to the date and timing of testing to ensure the validity of the patient treatment information.

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Fig. 4 is a flow chart for part of a data verification procedure relating to the date

and timing of testing to ensure the validity of the patient treatment information.

Fig. 5 is a flow chart for part of a data verification procedure relating to the timing

and type of treatment to ensure the validity of the patient treatment information.

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Fig. 6 is a flow chart for part of a data verification procedure relating to the time of disposition from the emergency department to ensure the validity of the patient treatment information.

Fig. 7A is a flow chart for part of a data verification procedure relating to the final 5 emergency department diagnosis to ensure the validity of the patient treatment information.

Fig. 7B is a flow chart for part of a data verification procedure relating to the final emergency department diagnosis to ensure the validity of the patient treatment information.

10 Fig. 8A is a flow chart for part of a data verification procedure relating to the final hospital discharge diagnosis to ensure the validity of the patient treatment information.

Fig. 8B is a flow chart for part of a data verification procedure relating to the final hospital discharge diagnosis to ensure the validity of the patient treatment information.

15 Fig. 8C is a flow chart for part of a data verification procedure relating to the final hospital discharge diagnosis to ensure the validity of the patient treatment information.

Fig. 9A is a flow chart for part of a data verification procedure relating to the patient's primary care physician to ensure the validity of the patient treatment information.

20 Fig. 9B is a flow chart for part of a data verification procedure relating to the patient's cardiologist to ensure the validity of the patient treatment information.

Fig. 9C is a flow chart for part of a data verification procedure relating to when the patient did not have a physician to ensure the validity of the patient treatment information.

5 Fig. 10A is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 10B is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 10C is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

10 Fig. 10D is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 11A is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

15 Fig. 11B is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 11C is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 11D is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

20 Fig. 11E is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 12A is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 12B is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

5 Fig. 12C is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 12D is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

10 Fig. 12E is a flow chart for part of a data verification procedure relating to treatment given to the patient to ensure the validity of the patient treatment information.

Fig. 13 is part of a flow chart for a preferred format for the relational database for the patient treatment information.

Fig. 14 is part of a flow chart for a preferred format for the relational database for the patient treatment information.

15 Fig. 15 is part of a flow chart for a preferred format for the relational database for the patient treatment information.

Fig. 16 is part of a flow chart for a preferred format for the relational database for the patient treatment information.

20 Figs. 17A - M show typical user data entry formats of one preferred embodiment of the system of the present invention.

## DESCRIPTION OF THE INVENTION

The present invention is a data processing system for evaluating treatment of chest pain patients in a medical facility. The system comprises means for entering patient treatment information, means for storing the patient treatment information, means for retrieving the patient treatment information, means for comparing the patient treatment information to predetermined values, and means for reporting the comparison of the patient treatment information to the predetermined values, so that the medical facility is able to improve its treatment of chest pain patients. In addition, the system comprises means for identifying the need to provide additional training for a medical care giver or a medical facility, and means for allocating staff resources in a medical facility.

A data processing method for evaluating treatment of chest pain patients in a medical facility is also disclosed. The method comprises entering patient treatment information, storing the patient treatment information, retrieving the patient treatment information, comparing the patient treatment information to predetermined values, and reporting the comparison of the patient treatment information to the predetermined values so that the medical facility is able to improve its treatment of chest pain patients. The reported comparisons can be used to evaluate a treatment protocol, a medical care provider, or a medical facility. They can also be used to identify the need to provide additional training for a medical care provider, or a medical facility. In addition, they can be used to allocate staff resources in a medical facility.

The data processing system for evaluating treatment of chest pain patients in a medical facility of the present invention can comprise a single personal computer, a network of personal computers connected together, or a central computer connected to a network of data entry terminals.

5 Information concerning patient treatment is entered into the system. Information can be entered using a keyboard or a non-keyboard method of data entry. The patient treatment information is stored in a relational database. The system processes the information as requested and compares it to predetermined values. The system prepares a report of the comparison of the patient treatment information with the predetermined  
10 values. The system uses this reported comparison to evaluate treatment protocols, individual performance of medical care providers, and overall performance of the medical facility.

The database can be created using any commercial database program, such as ACCESS<sup>®</sup> by Microsoft. Figs. 1 to 12 describe a data verification procedure to ensure  
15 the validity of the patient treatment information which is to be entered. Figs. 13 to 16 describe a preferred format for a relational database for the patient treatment information. Figs. 17A to 17M show typical user data entry formats of one preferred embodiment of the system of the present invention.

Patient treatment information includes data concerning the particular patient, such  
20 as name, age, doctor, cardiologist, symptoms, and time of onset of symptoms. It can also includes information concerning the testing and treatment received by the patient, such as

whether and when an electrocardiogram (EKG) was done, whether and when other tests used to identify AMI were done, and when certain treatment was initiated and completed.

The patient treatment information is compared to certain predetermined values. The predetermined values could be care standards set by a medical group, or they could 5 be values which are based on past experience, such as an average of prior data points.

The standardization of the parameters to be measured allows evaluation of the effectiveness of treatment protocols. It also allows evaluation of the adherence to those protocols of medical care providers, individually and collectively, at a single facility, a group of facilities, regionally, and nationally.

10       The system and method can evaluate whether a particular patient's treatment fell within recommended guidelines. They can also evaluate the performance of a particular emergency department doctor or nurse over time to determine, for example, whether he/she is meeting recommended guidelines for obtaining an initial EKG, whether other tests for AMI are being performed in a timely fashion, or whether appropriate treatment is 15 being given based upon the test results. They can also evaluate whether a medical facility, such as an observation unit, is meeting these guidelines.

In addition, the system and method can be used to identify whether a particular medical care provider or medical facility is failing to meet guidelines, and therefore needs additional training in treating chest pain patients.

20       The method can also be used to predict future staffing needs more accurately using documented past experience.

The system and method can be used to evaluate medical care providers including, but not limited to, particular doctors, nurses, or technicians. The types of medical facilities which can be evaluated include, but are not limited to, a hospital, a specific department within a hospital, a group of hospitals, or some other type of medical facility such as an outpatient clinic.

The system and method can be used to evaluate the performance of payors. With the widespread acceptance of managed care organizations, management of the interface between the payor and the medical care provider has been crucial. In some instances, in order for the medical care provider to meet appropriate benchmarks, the payor must also meet timely deadlines. This system and method can be used to determine if payors are meeting their performance standards.

The system and method can also be used to reduce the cost delivering care. The system links clinical care to the financial cost of care. By having accurate information on patient testing, appropriate testing and the timing of testing can be managed. The result is better care at lower cost.